

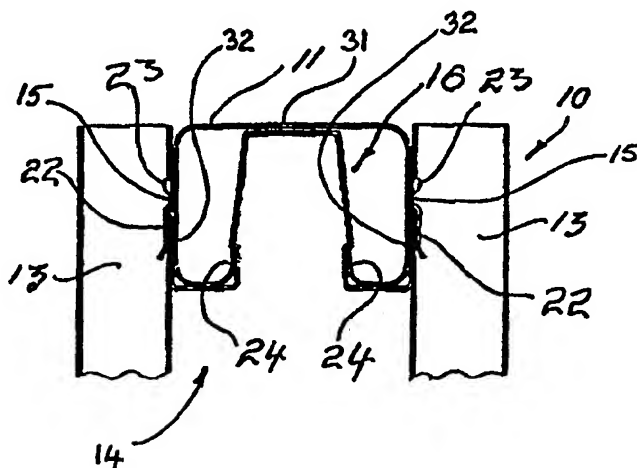


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>E04H 17/14</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 97/03266</b> <b>(43) International Publication Date:</b> 30 January 1997 (30.01.97)
<b>(21) International Application Number:</b> PCT/AU96/00447 <b>(22) International Filing Date:</b> 12 July 1996 (12.07.96) <b>(30) Priority Data:</b> PN 4134 12 July 1995 (12.07.95) AU <b>(71) Applicant (for all designated States except US):</b> BHP STEEL (JLA) PTY. LTD. [AU/AU]; 600 Bourke Street, Melbourne, VIC 3000 (AU). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> MATTHEWS, Douglas, Evan [AU/AU]; 6/20 Virginia Street, North Wollongong, NSW 2500 (AU). STARK, Graeme, Keith [AU/AU]; 2 Bimbadeen Avenue, West Wollongong, NSW 2500 (AU).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** FENCE POST AND RAIL COMBINATION**(57) Abstract**

A post and rail assembly for a fence where the post (10) and rail (11) are formed from sheet metal. The post (10) is shaped with a longitudinally extending recess (14) in one or both sides. Slots (15) in the recess provide for a clip (16) to be attached within the recess in order to support the rail. A preferred version has the clip snap fit to both the rail (11) and the post (10), while permitting rotation of the joint, so the fence can be constructed with the rail significantly inclined from orthogonal to the post.



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## FENCE POST AND RAIL COMBINATION

This invention relates to fences, and in particular to fences comprising posts  
5 and rails fabricated from sheet metal.

Such a fence may comprise no more than a plurality of spaced apart upright  
posts and one or more rails extending between each pair of neighbouring  
posts. Usually, but not necessarily, there is more than one rail between  
10 each pair of posts, in which event the rails may be relatively closely spaced  
apart and the fence may comprise no other major components. That is to  
say each panel of the fence may be constituted entirely by a rail or rails.

In other instances each fence panel may comprise a small plurality of rails,  
15 for example a top and a bottom rail, or top and bottom rails and an  
intermediate rail, supporting in-fill means such as, for example, a plurality of  
pickets or other upright members or one or more rigid sheets.

The present invention is applicable to all such fence constructions, being  
20 directed essentially to the affixure of the posts to the rails.

Sheet metal fences have gained in popularity in recent times, especially  
when made of steel that has been pre-coated with zinc, an aluminium-zinc  
alloy, or other corrosion resistant coating and finish painted by the materials  
25 supplier, because of their long life and attractive appearance.

However, there is some perception that sheet metal fences, being  
assembled from pre-fabricated components, are less readily adapted to  
various site conditions or require more specialised on-site labour for their  
30 erection than more conventional so-called paling fences made of timber.  
Those perceptions largely arise from the need to use threaded fasteners for  
securing the fence parts together such that erection of a fence requires

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    mating parts to be drilled to receive the fasteners. By comparison, the use of nails in the more conventional fences requires neither preparation of the parts for their reception nor precision in their positioning.

5     Also, there is a need for improved reliability of metal fence construction techniques. A study of the causes of premature failure of sheet metal fences has shown that a major reason was incorrect assembly, and in particular insufficient fastening of components to each other at the fence post. In many cases where the fence design requires rails to be held in place  
10    between two halves of a post which post is fastened together by threaded fasteners on site, there has been a tendency by the person erecting the fence to reduce the number of fasteners, from that specified by the manufacturer, in order to save a very small amount of time and cost, but consequently substantially weakening the whole fence structure.

15

    Therefore an object of the present invention is to simplify the erection of sheet metal fences by providing for the ready affixture of the rails to the posts without the need for screwed fasteners to pierce the respective components.

20

    A secondary object of the invention, attained by preferred embodiments thereof, is to provide for such affixture by means which not only permit a rail to extend horizontally from a nominally vertical post but also permit for a degree of departure from horizontality in either sense, so as to better adapt  
25    pre-fabricated fence components for use in fences on sloping or undulating sites.

    Accordingly, from one aspect, the invention consists in the combination of a fence post and rail comprising a sheet metal post shaped so as to define a  
30    longitudinally extending recess in a side of the post, post coupling means formed in the metal defining the recess, rail supporting clip means comprising clip coupling means in snap engagement with the post coupling

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means, and a sheet metal rail having an end portion disposed within the recess in snap engagement with the rail supporting clip means.

From another aspect, the invention consists of a method of attaching a rail to  
5 a post in a fence comprising providing:

- the post shaped from sheet metal so as to define a longitudinally extending recess in a side of the post;
- the rail, formed from sheet metal, in the form of an inverted channel sectioned body having a channel web portion and two channel flange portions;  
10
- post coupling means comprising two arcuate or chevron shaped slots, one opposite the other in opposing side faces, in the metal defining the recess;
- clip coupling means comprising two tongues on a rail supporting clip  
15 means adapted to in use hook over lower edges of the respective slots;

and locating the tongues into the slots and locating the channel flange portions into the rail supporting clip means.

- 20 In preferred embodiments the post coupling means comprises two arcuate or chevron shaped slots, one in each of two opposite side faces of the recess, and the co-acting clip coupling means comprises two tongues on the clip means adapted to hook over lower edges of the respective slots and two bosses are provided on the clip means and adapted to snap under the upper  
25 edges of the respective slots when the tongues are fully homed, so as then to prevent the clip means rising and the tongues from retracting from the slots. In further preferred embodiments, by virtue of the shape of the slots the clip coupling means remain in engagement with the post coupling means while permitting some rotation of the clip, and of a rail engaged with it, about  
30 a horizontal axis extending from one said side face of the recess to the other.

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For preference the channel flange portions of the rail have inturned lipped flanges extending along their free edges and the clip means defines two troughs with non-return detent means in one side wall thereof. In that event, the clip means and the rail are so dimensioned that the edge margins of the channel flanges including the lipped flanges may be inserted into the respective troughs, during which insertion the resilient lipped flanges are deformed as they ride over the detent means, and following which the rail is gripped by the clip means due to the total or partial return of the lipped flanges to their undeformed shape and consequent inability to move past the detent means in the return direction.

By way of example, an embodiment of the above described invention is described in more detail hereinafter with reference to the accompanying drawings.

Figure 1 is a plan view of a fence post.

Figure 2 is a plan view of the post of Figure 1 with rail supporting clip means in place.

Figure 3 is a sectional view taken on line 3-3 of Figure 2, but with fence rails in place.

Figure 4 is a view similar to Figure 3 taken on line 4-4 of Figure 2.

Figure 5 is a side elevation of clip means appearing in Figures 2, 3 and 4 drawn to a larger scale.

Figure 6 is a front elevation of the clip means of Figure 5.

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Figure 7 is a detail view drawn to a larger scale of a fragment of the post of Figure 1, when viewed along the arrow marked 7 in Figure 1, showing post coupling means thereof.

- 5 Figure 8 is a diagram to a larger scale of the post coupling means of Figure 7 indicating the interaction of the clip means of Figures 5 and 6 therewith.

The illustrated embodiment comprises an intermediate fence post 10 supporting two fence top rails 11 extending in opposite directions from the post 10. In such instances the post defines two rail receiving recesses (14), one on each side thereof. The recesses are functionally identical and the mode of affixture to the post is the same for each rail. Thus, for the purposes of this description, no attempt is made to distinguish between the duplicated components herein. Also, it will be appreciated that the description applies with equal force to an end post which may have only one recess with a rail or rails extending in only one direction therefrom.

The post 10 comprises a web 12 and two hollow flanges 13 defining longitudinally extending recesses 14 on opposite sides of the post. The post 10, may be cold roll-formed from a single sheet of pre-painted steel, with the edges 27 securely affixed to the web 12 by clinches 28 applied in an operation such as that described in Australian patent application 50457/93 or 77725/94 immediately after roll-forming.

25 The side walls of the recesses 14 are each pierced by a chevron shaped slot 15 near the top of the post 10, making four slots in all. The two slots 15 of each recess 14 constitute the post coupling means in respect of the affixture of a corresponding one of the top rails 11. In other embodiments the recess side walls may be pierced by a series of equally spaced apart slots, one above the other, to provide for the affixture of further rails below the top rail.

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The clip means of the embodiment now being described comprises a single clip 16 which is cut and press-formed from one piece of sheet metal. Each clip 16 is adapted to bridge across a recess 14, and has clip coupling means adapted to engage the slots 15 adjacent its ends.

5

Thus each clip 16 comprises a generally W-shaped strip (see Figs. 5 and 6) comprising two inner limbs 17, two outer limbs 18 and short upper and lower junction pieces 19 and 20 respectively. Each inner limb 17 is stepped at 21. Thus each adjacent pair of inner and outer limbs and the junction 20  
10 connecting them define a trough 29, and the step 21 constitutes non-return detent means in a wall of that trough.

Each outer limb 18 has a tongue 22, which is slit and displaced from the limb together with a boss 23 pressed from the plane of the limb. The tongue 22  
15 and boss 23 are so sized and positioned relative to each other that if a clip 16 is inserted downwardly into the recess 14 of a post furnished with a pair of slots 15, the tongues 22 may simultaneously pass through the slots 15 of the recess until the junction of each tongue and outer limb 18 comes up against the lower edge of the corresponding slot. At that time the bosses 23  
20 just clear the upper edges of the slots and allow the clip to snap into place, as may best be seen from Figures 3 and 4.

Each rail 11 is an inverted channel section having a channel web 31 and two channel flanges 32. Each channel flange 32 has an inturned lipped flange  
25 24 extending along its free edge. Once the clip 16 has been emplaced, the rail 11 may be pushed down onto the clip with the channel flanges entering the respective troughs 29 until the free edge of the lipped flanges ride past the steps 21, whereupon the rail is held fast against return upward movement.

30

The angular movement then available to the rail is indicated in Figure 8 where the interaction of the tongue and boss of the clip coupling means and



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the slot of the post coupling means in shown. In this example the rail may incline upwardly or downwardly by about 15°.

5 In other, less preferred embodiments, the single clip 16 may be replaced by two clips each able to independently engage the post coupling means, for example two clips each comprising substantially half of clip 16 minus the central portion above the steps 21.

10 It can be seen that for each of the above described embodiments, the post and rail join is visually neat, with the exposed faces of the posts undisturbed by fasteners. As the post's flanges are hollow, the slots in the recesses open into the flange hollows, so limiting visibility of the slots and tongues in the constructed fence.

## CLAIMS

1. The combination of a fence post and rail comprising a sheet metal post shaped so as to define a longitudinally extending recess in a side of the post, post coupling means formed in the metal defining the recess, rail supporting clip means comprising clip coupling means in snap engagement with the post coupling means, and a sheet metal rail having an end portion disposed within the recess in snap engagement with the rail supporting clip means.
2. The combination according to claim 1 wherein the post coupling means comprises two arcuate or chevron shaped slots, one in each of two opposite side faces of the recess, and the co-acting clip coupling means comprises two tongues on the clip means adapted to hook over lower edges of the respective slots.
3. The combination according to claim 2 wherein two bosses are provided on the clip means and adapted to snap under the upper edges of the respective slots when the tongues are fully homed, so as then to prevent the clip means rising and the tongues from retracting from the slots.
4. The combination according to either claim 2 or 3 wherein the slots are shaped such that the clip coupling means remain in engagement with the post coupling means while permitting some rotation of the clip, and of the rail engaged with it, about a horizontal axis extending from one said side face of the recess to the other.
5. The combination according to any one of claims 2 to 4 wherein the post comprises a web and two hollow flanges defining two of said longitudinally extending recesses on opposite sides of the post such that the slots in the recesses open into the flange hollows, so limiting visibility of the slots and tongues.

6. The combination according to any one of the preceding claims wherein the rail comprises an inverted channel-sectioned body having a channel web and two channel flanges, said channel flanges having inturned  
5\* lipped flanges extending along their free edges, and the clip means define two troughs with non-return detent means in one side wall thereof, and the flange lips locate onto the detent means to resist upward movement of the rail.

10 7. The combination according to any one of the preceding claims wherein the rail supporting clip means is a single generally W-shaped clip formed from a single piece of sheet metal and the clip bridges the recess between respective post coupling means on opposite side faces of the recess.

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8. The combination according to any one of claims 1 to 6 wherein the rail supporting clip means comprises two clips, each of which independently engages the post coupling means.

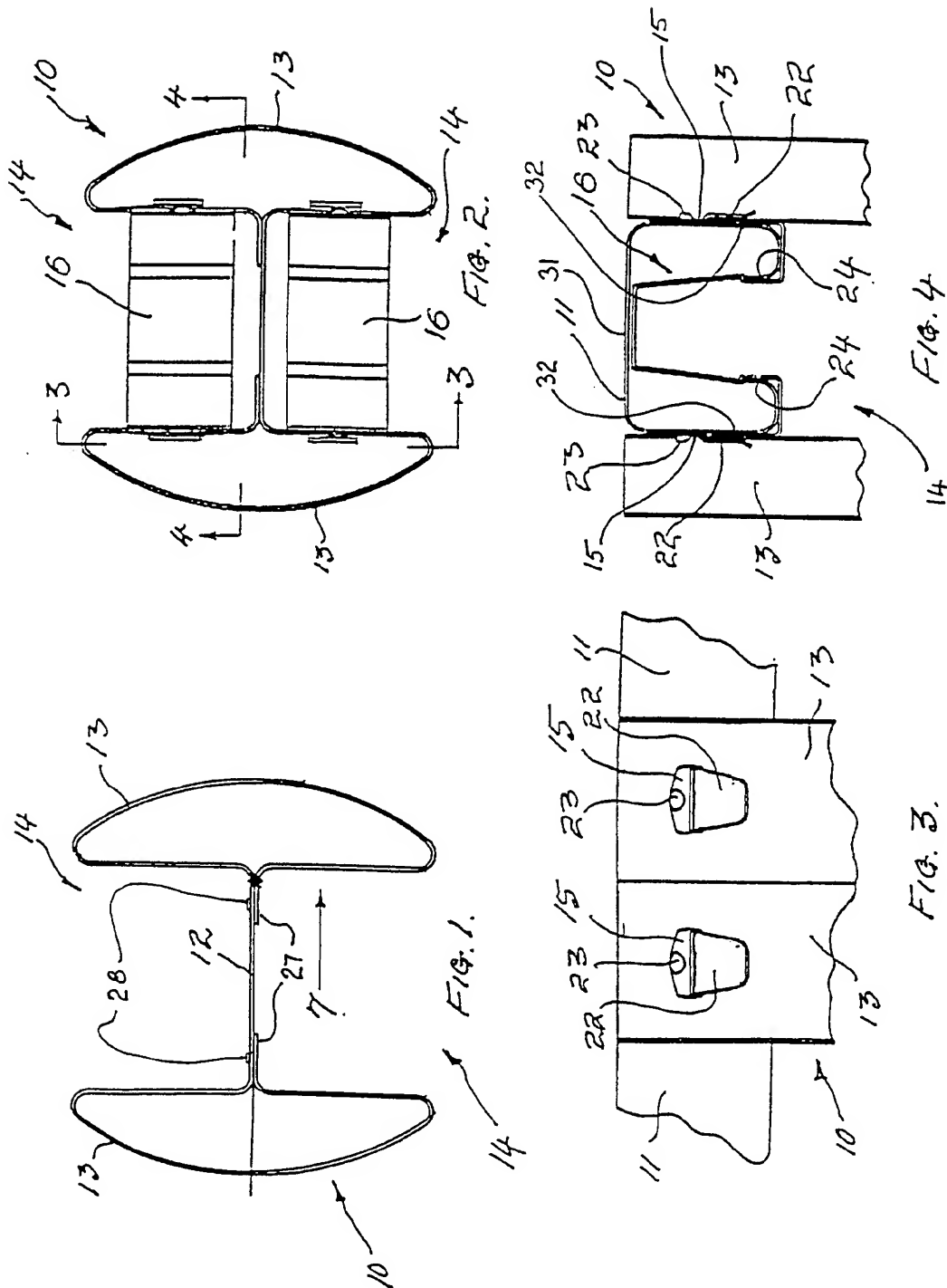
20 9. A method of attaching a rail to a post in a fence comprising providing:  
- the post shaped from sheet metal so as to define a longitudinally extending recess in a side of the post;  
- the rail, formed from sheet metal, in the form of an inverted channel sectioned body having a channel web portion and two channel flange  
25 portions;  
- post coupling means comprising two arcuate or chevron shaped slots, one opposite the other in opposing side faces, in the metal defining the recess;  
- clip coupling means comprising two tongues on a rail supporting clip  
30 means adapted to in use hook over lower edges of the respective slots;

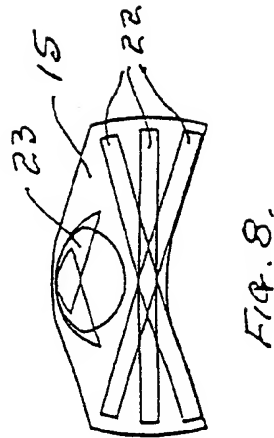
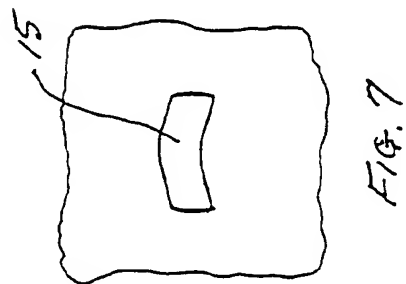
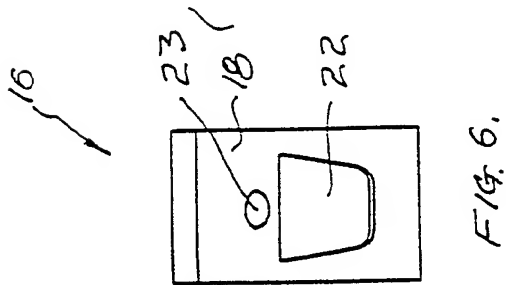
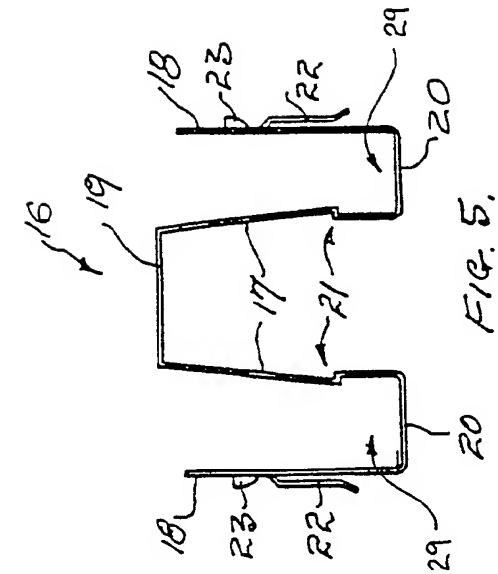
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and locating the tongues into the slots and locating the channel flange portions into the rail supporting clip means.

10. A method according to claim 9 wherein a boss on the rail supporting clip means snaps under the upper edges of a respective slot to prevent the respective tongue from retracting from its slot.

11. A method according to either of claims 9 or 10 wherein the channel flange portions of the rail have inturned lipped flanges extending along their free edges and the clip means defines two troughs with non-return detent means in one side wall thereof, said method comprising inserting the edge margins of the channel flanges including the lipped flanges into the respective troughs, during which insertion the resilient lipped flanges are deformed as they ride over the detent means, and following which the rail is gripped by the clip means due to the total or partial return of the lipped flanges to their undeformed shape and consequent inability to move past the detent means in the return direction.





# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/AU 96/00447

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b>																						
Int Cl <sup>6</sup> : E04H 17/14																						
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<b>B. FIELDS SEARCHED</b>																						
Minimum documentation searched (classification system followed by classification symbols) IPC : E04H 17/14, 17/20, E04B 2/58																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU IPC : as above																						
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<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																						
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
X	AU 33722/93 A (662038) (JOHN LYSAGHT (AUSTRALIA) LIMITED), 9 September 1993 figure 3	1, 9																				
X	AU 60638/86 A (574930) (AUSTRLAIAN BUILDING INDUSTRIES PTY LTD), 29 January 1987 figure 5	1, 9																				
A	AU 54752/94 A (WAKEFIELD), 11 August 1994 figure 1																					
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Date of the actual completion of the international search 13 September 1996		Date of mailing of the international search report 3 OCT 1996																				
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (06) 285 3929		Authorized officer  <b>PETER T. WEST</b> Telephone No.: (06) 283 2108																				

## INTERNATIONAL SEARCH REPORT

International Application No.

**PCT/AU 96/00447**

C (Continuation)		DOCUMENTS CONSIDERED TO BE RELEVANT	FORM 28/0847
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
A	US 4193245 A (JOHNSON), 18 March 1980 figure 4		
A	GB 1468190 A (EKERT et al), 23 March 1977 figure 2		
A	DE 2448858 A1 (PICHON), 24 April 1975 figure 2		
A	US 3879017 A (MAXCY et al), 22 April 1975 figure 3		
A	EP 050838 A1 (ELTREVA AG), 5 May 1982 figure 3		



## INTERNATIONAL SEARCH REPORT

## Information on patent family members

International Application No.

PCT/AU 96/00447

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Patent Document Cited in Search Report		Patent Family Member					
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AU	60638/86						
AU	54752/94						
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GB	1468190	AU	75443/74	JP	50106427		
US	3879017						
DE	2448858	AT	8313/74	FR	2271433	IT	1023563
EP	50838	DE	3040642				
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